

at base 3 lines, length of last whorl 2 lines, length of penultimate whorl  $1\frac{1}{2}$  line.

I imagine this may be the Scotch fossil referred by Mr. Salter (Quart. Geol. Journ. for August 1851) to the Upper Ludlow, *Turritella (Holopella) obsoleta* of Sowerby, as it has very much the same size and shape; and the distinctive spiral lineation requires a good cross light and some care to detect; but with these and a lens of low power it may be always seen, even in the sandstone casts, and the species thus easily distinguished from that of the newer rocks. The sutures are always more oblique than in the *H. obsoleta*. The slight inequality of size of the striæ seems in parts subalternate, in parts irregular.

Common in the sandstone of Mulock quarry, Dalquorhan.  
(Col. University of Cambridge.)

## PROCEEDINGS OF LEARNED SOCIETIES.

### ZOOLOGICAL SOCIETY.

July 9, 1851.—John Gould, Esq., F.R.S., in the Chair.

The following paper was read:—

#### ON THE GENERIC SUBDIVISION OF THE BOVIDÆ, OR HOLLOW-HORNED RUMINANTS. BY H. N. TURNER, JUN.

In the series of observations upon the Ungulate Mammalia, of which I attempted last winter to lay before the Society the more general results, my attention was also in some measure directed towards the detailed arrangement of those portions of the order which have generally proved subjects of difficulty. Of these, the classification of the *Bovidæ*, or hollow-horned Ruminants, has certainly been the greatest, since they form a well-marked natural group, including a great variety of forms, with but few remarkable differences of structure. I soon found, however, that even setting aside some of the more strikingly-modified genera, the distinctions afforded by the skull were much more decided than any that I could find among the *Cervidæ*, which, from their being less rich in number and variety, were always easier to subdivide correctly. Not having been able at that time to observe the skulls of certain of the more remarkable forms, I set the matter aside for better opportunities; and now that the large and interesting collection of hunters' spoils which Mr. Roualeyn Gordon Cumming has brought together, and is at present exhibiting in London, has given me the opportunity of supplying some of these desiderata, I venture, although there are yet a few points I could wish to ascertain, to lay this portion of my researches before the Society.

There cannot be a doubt that the horns present the best and most readily discernible characters, or that, when the genera are once correctly determined, they may be pretty easily defined by the variations of these parts alone; but it has long since been seen how the con-

sideration only of the horns has led to very unnatural approximations. For example, Cuvier associates the Addax with the Indian Antelope; and Mr. Blyth, his translator, inserts his belief that it is more allied to the Coudou, which I think modern naturalists will allow to be equally wide of the truth. Again, the species forming the genera *Ægocerus* and *Nemorhædus* of Major Smith are placed together in the 'Règne Animal,' and Mr. Blyth hints that the Anoa may be allied to the Oryx.

It is certainly remarkable, that while the teeth have contributed so important a share in the characters by which the mammalia have been arranged by various authors, they should have been so entirely overlooked in the members of the present division; for notwithstanding the great uniformity and strongly-marked character pervading the Ruminant dentition, very decided characters may frequently be found in the form and direction of the incisors, and in the presence or absence of the supplemental lobe in the molars; and it is the more to be wondered at when we consider that the incisors, from their position, may often easily be seen in dried specimens, and that the character alluded to in the molars has been found of considerable value in the interpretation of fossil remains. The remaining characters I shall have to bring forward consist of certain little details of structure in the skull, which are very easy to be perceived, and which, as I have found them constant in those groups which I have characterized by their means, I trust may meet with due consideration from naturalists.

Of late years, while some zoologists have remained content to call all hollow-horned Ruminants that are neither oxen, sheep, nor goats, by the generic name *Antelope*, another class have run into the extreme of the modern fashion by using every trifling external difference visible in dried skins, or recorded in books (sometimes not even excepting size and colour), to divide them so extensively, that the characters of the genera become more difficult to remember than those of the species. Considering the difficulty of observing many of these characters in dry specimens, and of bearing such trivial details in the memory, it is not to be wondered at that many errors of observation have crept in, a few of which I will point out as I proceed, limiting myself in my own diagnoses to the characters of the skull and horns. There is no doubt that the suborbital sinus, improperly called "lacrymal sinus" (translated into "tear-pit" by some authors, "tear-bag" by Mr. Gray), will form a valuable means of distinction when its structure in all the genera has been sufficiently observed upon fresh individuals, or on the parts preserved in fluid, provided that we do not attach too much importance to its relative dimensions; but although its dried appearance may assist discrimination, we cannot venture to describe it. As to inguinal pores and interdigital pits, it must always be difficult, and frequently impossible to determine their presence or absence in specimens that are dried and mounted. Tufts upon the joints of the limbs, and the extent of bare space upon the muzzle, are certainly much too trivial to warrant generic distinction, and never mark out any particular natural group.

The last attempt to arrange this extensive family in subordinate groups is that of Mr. Gray, published in the eighteenth volume of the 'Annals and Magazine of Natural History.' His preliminary remarks, though brief, appear to me quite sufficient to dispose of the arrangements previously set forth, therefore I will content myself with the consideration of his own. The two primary divisions, which are founded only upon the horns, certainly do not indicate any very natural affinities, since, taking the whole structure into consideration, the *Antilopeæ* of Mr. Gray are not more closely allied to the *Bovææ* than they are to the members of the second primary division, nor do the *Strepsicerææ* ally themselves particularly to the Sheep and Goats. With regard to the subdivision of the *Antilopeæ*, he is certainly right in separating the "Antelopes of the Desert" as a group, although there is no doubt that some of the divisions of the "Antelopes of the Fields" are equally as distinct from each other as they are from the former. The division of the latter group into "True Antelopes," "Caprine Antelopes," and "Cervine Antelopes," also possesses some merit; but the genera *Capricornis* and *Nemorhædus* are very distinct from the other Caprine Antelopes, and the genus *Eleotragus* (*Redunca* of Major Smith) is very distinct from the other true Antelopes, and ought, as I am quite convinced, to include the genus *Kolus* of Dr. Andrew Smith, placed by Mr. Gray among his Cervine Antelopes, and consisting of species not known at the time Major Smith was engaged in these researches.

It will be universally admitted, that for the generic division of the Ruminants, zoology is most indebted to Major Smith, and in the course of my observations I have found reason to reject but few of the divisions proposed by him as subgenera, and few, if any, in my opinion, need be added. As I thus propose to curtail the list of genera adopted by Mr. Gray, and to separate certain of them from those with which he has associated them, several will stand alone; and of those which do ally themselves together, no group seems to manifest that particular relationship with other groups which should warrant us in separating the family, as Mr. Gray has done, into divisions of a primary, secondary, tertiary, and in some cases even a fourth and fifth degree of rank.

I will, therefore, while enumerating the characters which I have observed in the genera I propose to adopt, point out which of them appear to constitute groups, and mention those species which, from the inspection of entire specimens, skulls, or at least horns, I feel warranted in referring to the genera under which I place them. As I have seen nothing to guide me to a particular linear arrangement, any naturalist who may be pleased to adopt my divisions is at liberty to place the groups, and the genera contained in each, in whatever order he may think most convenient.

I will first proceed to the "true Antelopes" of Mr. Gray, excluding the genus *Eleotragus*. They all have the horns round, the middle incisors expanded at their summits, the others being bent outwards to make room for them, and the molars without supplemental lobes. The infraorbital depression when existing upon the skull is gene-

rally suddenly pressed in before the orbit. The genera are as follows :—

#### ANTILOPE.

No suborbital fissure nor fossa\*, but a wide opening on the side of the muzzle, between the maxillary and intermaxillary bones; the masseteric ridge rising before the orbit; the auditory bulla large and prominent, with only a small groove on its outer side to receive the attachment of the stylohyal bone; the occiput broad, somewhat produced downwards; its basal portion with the posterior pair of tubercles broad, the anterior ones small. Molars without the supplemental lobe.

Horns annulated, curving outward from the base, then bending backwards and towards the tip upwards.

*Hab.* South Africa.

*A. Melampus.*—Of this single species, to which modern zoologists have confined the old generic name, I have only seen skulls of the male, in Mr. Cumming's collection: the lower jaw, as in most of his skulls of Ruminants, being wanting in all of them, I could not ascertain the character of the incisive teeth.

Major Smith assigns a suborbital sinus to this genus, making the principal distinction from the next to consist in the absence of horns in the female, thus associating with it the *gutturosa* and *colus*, belonging properly to the next genus,—the *cervicapra*, which it seems most convenient to separate,—and the *adenota*, which I must now refer to the genus *Eleotragus*. With his *A. forfex* I am at present unacquainted. *Melampus* alone remains, to which Mr. Gray rightly assigns no "tear-bag;" this, together with the horns, must be the external character of the genus, if, indeed, it be essentially distinct from the Gazelles, for the horns might be considered as a distorted modification of the lyrate type, and some species of that genus seem to want the suborbital sinus.

#### GAZELLA.

A suborbital fissure, and a moderate, or very slight fossa, suddenly pressed in before the orbit; the masseteric ridge rising before the orbit; the auditory bulla large and prominent; the basioccipital bone having its tubercles moderately or but little developed; the median incisors expanded at their summits; the molars without supplemental lobes.

Horns annulated, more or less resembling an inverted lyre; that is, bending a little outwards soon after their origin, and again inwards towards the tip.

*Hab.* Eastern Europe, Asia and Africa.

\* I here use these terms with reference only to the skull, the fissure being that opening existing in most Ruminants, filled up during life by membrane, between the nasal, frontal, lacrymal and maxillary bones; and the fossa, the depression upon the surface of the lacrymal bone immediately before the orbit, generally affording some indication as to the existence and structure of the suborbital sinus.

<i>G. dorcas.</i>	} Of these species I have seen skulls.	<i>G. subgutturosa.</i>
<i>G. Bennettii.</i>		<i>G. Sæmmeringii.</i>
<i>G. euchore.</i>		<i>G. mhorr.</i>
<i>G. gutturosa.</i>		<i>G. colus.</i>
		<i>G. kemas.</i>

Several of the so-called species that are closely allied in size and colour to *G. dorcas*, appear to me to be merely varieties, as some of them have been considered by the older naturalists.

This genus seems prone to exhibit in certain species inhabiting more temperate regions, enlargements of, or appendages to, the respiratory passages; for example, the enlarged larynx of *G. gutturosa*, the elevated nose of *G. colus*, and the appendages to its sides in the Chiru (*G. kemas*); these seem to be physiological adaptations, in no case marking a group, and therefore insufficient to warrant generic distinction, which has been made in the two latter instances. However, not having as yet seen entire skulls of these species, I retain them provisionally in this genus, judging by the horns. I think few naturalists will set forth, with Mr. Gray, the colour of the horns of the Saiga as a generic character. Even in the *G. Bennettii*, so closely allied to *G. dorcas*, Mr. Hodgson states that the suborbital sinus is wanting, and he places the animal in a distinct genus, *Tragops* (afterwards altered to *Tragomma*), on account of this difference; while Colonel Sykes, the original describer of the species, affirms that it exists, though of very small size. Mr. Hodgson also denies it to the Chiru, which forms his genus *Panthelops*, and to which he assigns only five molars in each series.

#### CERVICAPRA.

A small suborbital fissure, and a very large fossa; the tubercles and median groove of the basioccipital bone well-developed. The other cranial characters as in *Gazella*.

Horns annulated, spirally twisted.

*Hab.* India.

*C. bezoartica.*

The remainder of this group, if we exclude the *Cephalophi* and the four-horned Antelopes of India, consists of a number of small species, apparently nearly allied, forming the subgenera *Tragululus* and *Neotragulus* of Major Hamilton Smith. These are very distinguishable by the former having vertical, the latter recumbent horns; to the former, however, must be added the *Ourebi* (*A. scoparia*), from his subgenus *Redunca* (*Eleotragus*). Mr. Gray divides them into several genera, depending upon the presence or absence of inguinal pores and knee-tufts, the shape of the hoofs, the presence or absence and form of the "tear-bag," the condition of the fur; and one genus, founded upon two very young specimens, is characterized by the absence of the lateral rudimental hoofs. Most of these characters I must decidedly reject; and as I do not consider the evidence of dried skins quite satisfactory with regard to certain others, and have as yet seen skulls of only two species, I will content myself at present with adopting only the two genera of Major Smith; using however, for

the first one, Mr. Gray's generic name *Oreotragus*, without at present wishing to enter into the question of its right to supersede that of *Tragulus*, because the latter name has been also used by Mr. Gray for a group of small Musk Deer, needlessly separated from the *Meminna*.

I do not see sufficient in the small horns contained in the Museum of the College of Surgeons to warrant the adoption, as a genus, of Major Smith's subgenus *Raphicerus*. I will not attempt to conjecture to what species they may belong: they show nothing to prevent their ranking among the *Oreotragi*; and their locality, said to be the East Indies, while all the members of this genus are African, is not known with certainty.

#### OREOTRAGUS.

A small suborbital fissure, with a large deep fossa suddenly pressed in before the orbit; the masseteric ridge rising a little before the orbit; the auditory bulla rather large and prominent; the basioccipital bone flat and smooth; the median incisors expanded at their summits, and the molars without supplemental lobes.

Horns small, placed forwards, vertical.

*Hab.* Africa.

*O. saltatrix.*

*O. scoparius.*

*O. tragulus.*

*O. melanotis.*

} Of these two species I  
} have seen skulls.

#### NEOTRAGUS.

Horns recumbent.

*Hab.* Africa.

*N. saltianus*.—Of this animal I have seen no skull, but adopt for the present Major Smith's division, as the different direction of the horns is well-marked. It has the suborbital sinus, however, although its absence is assigned as a character by Major Smith. Of the other species included in the subgenus, I have seen but the two young specimens upon which Mr. Gray has founded his genus *Nanotragus*; they having no horns, I will not here venture to point out their location. The lateral rudimental hoofs are also wanting in at least one species of the last genus, the *Oreotragus Tragulus*, which Mr. Gray places in his genus *Calotragus*.

The skulls of the species of the two following genera are distinguished from those of the preceding ones by their having no suborbital fissure, and the fossa being large and not so suddenly pressed in in front of the orbit; and by the horns (or at least, in one case, the principal pair) being thrown back quite to the posterior edge of the frontal bone.

#### CEPHALOPHUS.

No suborbital fissure, a large fossa occupying the whole side of the cheek; the nasal bones expanded behind, reaching over a little way into the fossa. The other cranial characters as in *Oreotragus*.

Horns placed far back, inclined backwards.

*Hab.* Africa.

<i>C. mergens.</i>	<i>C. Maxwellii.</i>
<i>C. coronatus.</i>	<i>C. monticola.</i>
<i>C. silvicultrix.</i>	<i>C. punctulatus.</i>
<i>C. Ogilbii.</i>	<i>C. grimmia.</i>
<i>C. Natalensis.</i>	<i>C. Whitfieldii.</i>
<i>C. rufilatus.</i>	

I have taken this list of species from Mr. Gray's paper on the genus, published in the same volume of the 'Annals and Magazine of Natural History,' omitting a few that seem to me likely to prove varieties, and adding two, which I find named in the Museum, and not included in his paper. I have only seen skulls of two or three species, but no one will dispute the limits of this very distinct genus.

#### TETRACERUS.

The nasal bones not expanded; the other cranial characters the same as in *Cephalophus*, with the addition of a second pair of horns of small size, placed over the orbits.

*Hab.* India.

*T. quadricornis.*

*T. subquadricornis.*

#### ELEOTRAGUS.

Nasal opening rather lengthened, the nasal processes of the intermaxillary bones long, yet not always reaching the nasal bones; a large infraorbital fissure, but no fossa; the masseteric ridge ascending rather high; the auditory bulla large and swollen; the basioccipital bone with its median groove and tubercles well-developed; the median incisors expanded at their summits; a well-developed supplemental lobe in the first true molar of each jaw, and usually more or less appearance of it in those behind.

Horns inclining backwards and outwards, transversely wrinkled, gently curving upwards, and a little inwards towards the tip.

*Hab.* Africa.

*E. reduncus.*

*E. adenota.*

*E. isabellinus.*

*E. sing-sing.*

*E. capreolus.*

*E. ellipsiprymnus.*

*E. arundinaceus.*

*E. leché.*

I have seen skulls of the four preceding the last-named.

It is quite evident, both from the structure of the skull and horns, and from the general external appearance and markings, that the *Antelope adenota* of Major Smith, and certain large species forming Dr. Andrew Smith's genus *Kolus*, belong truly to this form, and that in the latter case, at least, naturalists must have been deceived by mere dimensions. The similarity of character between the horns of the *Adenota* and those of the other species is very recognizable, although Major Smith, judging by these parts alone, supposed them to belong to the lyrate type. The species does not appear among those mentioned in Mr. Gray's paper in the 'Annals and Magazine of Natural History,' but from the name and place assigned to the specimen in the British Museum, he appears to have evaded the difficulty by constituting it a genus of itself, which is placed near the genus *Kolus*,

the genus *Eleotragus* (as in his paper) being far removed. The skull in the Museum, although the occiput is lost, bears full evidence of its real affinity. Among the interesting additions to South African zoology discovered by those travellers who have visited the great lake recently discovered in that region, an undescribed species of Antelope\*, of which a beautiful skin was recently brought before the Society, will perhaps assist the more sceptical in osteological characters in arriving at a just conclusion on this point, since, while it has the stature and lengthened horns of the *ellipsiprymnus*, it has the brilliant colour and the external marks (particularly the dark stripe down the fore-leg) which characterize the smaller species.

This genus does not seem to show any particular affinity to any of the rest, and forms a well-marked group, of which the species are scattered over various parts of Africa, and are mostly noted for their predilection for the vicinity of water.

I here again adopt Mr. Gray's generic name, to avoid the necessity of altering the name of one of the species, the *E. reduncus*.

#### STREPSICEROS.

The nasal opening of moderate size; a suborbital fissure, but no fossa; the masseteric ridge not extending high; the auditory bulla swollen and prominent; the basioccipital bone with its anterior and posterior pairs of tubercles well-developed, the former separated by a deep median groove; the median incisors expanded at their summits; the molars without supplemental lobes.

Horns inclined backwards from the base, twisted, with one or more longitudinal angular ridges.

*Hab.* Africa.

<i>S. cudu.</i>	<i>S. Derbianus.</i>
<i>S. euryceros.</i>	<i>S. scriptus.</i>
<i>S. Angasii.</i>	<i>S. silvaticus.</i>
<i>S. oreas.</i>	<i>S. decula.</i>

The general aspect of the skull in this group reminds one a little of that of the Deer. The species all agree very closely, both in structure of the skull, and in the direction, twisting, and ridges of the horns, the Coudou differing only in having the spiral wide and open, and in the horns being confined to the male, while the Eland is only a gigantic representation of the smaller species. *S. euryceros*, *S. Angasii*, and a species most probably distinct from the rest, of which Capt. Allen brought a skull from the Bight of Biafra, show an intermediate condition of the horns; and in *S. Angasii*, at least, they are known to be wanting in the female. Major Smith himself has here been deceived by size, and been led to place the subgenus *Tragelaphus* under his genus *Antelope*, and the others under his genus *Damalis*; even availing himself of stature, and in the case of the Coudou, of a white streak over the eyes, to help out the meagre distinctions. In associating the Nyl-Ghau with these animals, Mr. Gray has even allowed colour and marking to deceive him, for in this animal the horns are not even spiral; but in another respect the charac-

\* Since named *Kobus teché* by Mr. Gray.



ters assigned to his *Strepsiceræ* agree with the Nyl-Ghau, and not with the others, which certainly have no suborbital sinus, nor have any of them an ovine muzzle, by which Mr. Gray distinguishes the larger genera from the *Tragelaphus*. In these latter points Major Smith is correct.

I will now proceed to the "Antelopes of the Desert" of Mr. Gray, a very well-marked, natural group, consisting of two distinct genera, which have usually been widely separated. Mr. Blyth, however, in the translation of Cuvier's 'Animal Kingdom,' hints at their affinity, and Mr. Waterhouse informs me that he has long held that opinion. Indeed he has placed the species next each other in the Catalogue of the Society's Museum.

#### ALCELAPHUS.

A large deep impression before the orbit, but no fissure; the maseteric ridge not extending high; the bones of the face lengthened downwards and forwards, and the occiput also prolonged and drawn downwards; the auditory bulla large and prominent, enclosing a large rounded space for the attachment of the stylohyal bone; the basioccipital tubercles high and sharp, the groove between them narrow in front, wide behind, with a flat space between the occipital condyles; the median incisors expanded at their summits; the molars rather small, narrow, and without supplemental lobes, showing, when somewhat worn, a pit in the middle.

Horns placed high, ringed at the base, with double flexures more or less marked.

*Hab.* Africa.

*A. bubalis.*

*A. lunatus.*

*A. Senegalensis.*

*A. pygargus.*

*A. caama.*

I have seen skulls of the three last-named.

Mr. Gray calls a portion of this genus "Boselaphus," doubtless intending *Alcelaphus* of De Blainville, which being antecedent to Major Smith's name *Acronotus*, should certainly be adopted. The genus is a very natural one, and the characters by which Mr. Gray proposes to divide it into two, are by no means sufficient. The last-mentioned species, *A. pygargus*, has usually been placed among the Gazelles, where it was left by Major Smith and by Mr. Blyth, who speaks of it as leading "through *A. Caama*, *Bubalis*, &c. to the Gnu." Mr. Waterhouse, who in the Catalogue of the Society's Museum uses the generic name *Antilope* throughout, places this species between the Gazelles and the others of its natural genus, to which the Gnu follows. Mr. Gray, who had left it with the Gazelles in the 'List of Mammalia' in the British Museum, has removed it to its true place in his paper in the 'Annals and Magazine.'

#### CATOBLEPAS.

The general characters of the skull the same as in *Alcelaphus*; but the depression before the orbit less marked; the occiput rather less prolonged, and its base, together with the auditory bulla, broader.

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Horns broad at the base, inclining more or less downwards and outwards, and then bent upwards.

*Hab.* Africa.

*C. gnu.*

*C. taurina.*

The next genus is included by Mr. Gray among his "Caprine Antelopes," but differs from them in having a suborbital sinus or gland, of large size in some species, and of peculiar structure, opening externally by a single pore. Their nasal bones resemble those of the domestic Sheep, and their structure being altogether rather heavy, they might be called *Ovine Antelopes*.

#### NEMORHÆDUS.

No suborbital fissure; the fossa rounded, shallow, very variable in size, sometimes very minute; the nasal bones rather short and broad, joining the maxillaries only by the interposition of some imperfect ossification or separated from them altogether; the masseteric ridge extending high before the orbit; the auditory bulla very small; the basioccipital bone broad, with moderately developed eminences; the middle incisors slightly expanded at their summits; the molars without supplemental lobes.

Horns rising behind the orbits, annulated and wrinkled at the base, inclined and curved backwards.

*Hab.* India and its islands.

*C. bubalina.*

*C. Sumatrensis.*

*C. goral.*

This genus is too well-marked by nature to admit of subdivision. Although the "tear-bag" is said to be wanting in the *Goral*, there is certainly a slight depression upon the lacrymal bone, and the pore with which the gland opens may be so small in this species as to escape detection in dried specimens; but if it be really absent, the instances of the genera *Gazella* and *Ovis* must warn us against founding a genus solely on the want of this organ, while on the other hand, a difference in its structure seems to be of great zoological importance.

Since the foregoing observations were written, I have perused Mr. B. H. Hodgson's interesting account of the *Budorcas taxicolor*, in the 'Journal of the Asiatic Society of Bengal,' and a glance at the representations of the skull indicates very plainly that it is closely allied to *Nemorhædus*, to which Mr. Hodgson admits certain resemblances, and that it has no relationship with the Gnu, or the Musk Ox. The characters that I assigned to *Nemorhædus* would appear to serve as well for this new and singular genus, except that there seems to be no suborbital depression, and the masseteric ridge, as may be expected from the general elevation of the skull, does not rise before the orbit. The horns, whose peculiar twist must constitute the diagnosis of the genus *BUDORCAS*, appear, from the rough figures given, to have the wrinkling at the base very similar to that in *Nemorhædus*.

The following genera may be considered as in some degree allied, and deserve the name of Caprine Antelopes. They have no sub-

orbital sinus, but have a fissure in the skull, and their incisors are not widened at the summits.

#### RUPICAPRA.

A minute suborbital fissure, but no fossa; the masseteric ridge ascending high before the orbit; the auditory bulla very small and compressed; the basioccipital bone flat; the incisors equal-sized, vertical; the molars without supplemental lobes.

Horns slender, round, vertical, and hooked backwards at the tip.

*Hab.* Europe.

*R. tragus.*

#### DICRANOCERUS.

No suborbital depression; the fissure lengthened; the nasal bones widest posteriorly; the orbit a little elevated above the line of the face, and the masseteric ridge not rising before it; the auditory bulla moderate, compressed and angular; the incisors equal-sized, sloping; the molars without supplemental lobes.

Horns vertical, compressed, with a process on their anterior side, and hooked backwards at the tip.

*Hab.* North America.

*D. Americanus.*

#### APLOCERUS.

Horns round, vertical, gently curved backwards.

*Hab.* North America.

*A. Americanus.*

I have seen no skull of this animal, but leave it for the present in this location.

I must forego all notice of the *Ixalus probaton* of Mr. Ogilby, as there is no skull to be seen, and the horns in the only specimen known are quite in a rudimentary condition.

The genera next to be considered are the "Cervine Antelopes" of Mr. Gray, exclusive of the genus *Kolus*, which I have rejected. With the exception of the Nyl-Ghau and some of the *Eleotragi*, they are the only members of the old genus *Antilope* that have well-developed supplemental lobes in all the true molars; they have always been placed near together.

#### ÆGOCERUS.

A small suborbital fissure, but no fossa; the masseteric ridge ascending high before the orbit; the auditory bulla moderate; the occipital portion of the skull much prolonged; the basioccipital portion widened, its two pairs of tubercles much developed, with a deep groove between them; the incisors gradually increasing in size to the median pair, which are not expanded at their summits; the molars with largely-developed supplemental lobes.

Horns rising immediately above the orbits, curved backwards, annulated.

*Hab.* Africa.

*Æ. leucophaeus.*

*Æ. niger.*

## ORYX.

A suborbital fissure, but no fossa, the masseteric ridge not extending high; the auditory bulla large and compressed; the basioccipital bone with its tubercles well-developed; the molars with supplemental lobes.

Horns straight or gently curved, annulated, placed in a line with the face.

*Hab.* Africa.

*O. gazella.*

*O. leucoryx.*

It is only in Mr. Cumming's collection that I have seen entire skulls of the Gemsbok, and the lower jaw being absent, I could not ascertain the character of the incisors. The skull of the *Leucoryx* I have not seen.

## ADDAX.

A small suborbital fissure, but no fossa; the masseteric ridge ascending before the orbit; the auditory bulla large, prominent, and compressed; the basioccipital bone with its anterior pair of tubercles slightly, the posterior well, developed; the median incisors expanded at their summits; the molars with supplemental lobes.

Horns nearly in a line with the face, annulated, spirally twisted.

*Hab.* Africa.

*A. naso-maculata.* I have seen but one skull of this animal, and that is a young one, in the Society's collection, still retaining the whole of its milk dentition.

Before proceeding to the Sheep and Goats, the Nyl-Ghau requires to be introduced. It seems to stand alone, not having a decided affinity for any other genus.

## PORTAX.

The nasal opening rather small, with the nasal bones small and narrow; a minute suborbital fissure; no fossa, but a smooth line upon the lacrymal bone; the masseteric ridge not extending high; the auditory bulla moderate, bulbous, compressed; the basioccipital bone with the posterior tubercles moderately developed, the anterior ones scarcely at all; the molars with supplemental lobes.

Horns short, round, vertical, slightly bent forwards.

*Hab.* India.

*P. picta.*—The only skull that I have seen (that in the British Museum) wants the incisor teeth, so that I could not ascertain their structure. The smooth line upon the lacrymal bone terminates in a small foramen, but on one side is continued for some distance forwards upon the maxillary bone, where it terminates in the same way; and it may even be faintly traced on the other side for some distance beyond the foramen.

## CAPRA.

A small suborbital fissure, no fossa; the masseteric ridge ascending high before the orbit; the auditory bulla prominent and compressed;

the basioccipital flat, with its processes developed ; the middle incisors not expanded ; the molars without supplemental lobes.

Horns erect, compressed ; curved backwards and a little outwards, or twisted ; annulated or nodulous, and furnished with one or more longitudinal ridges.

*Hab.* The Northern portions of the Old World.

*C. hircus.*

*C. Falconeri.*

*C. ibex.*

*C. jemlaica.*

I do not see sufficient reason for separating the Jemlah Goat, as has been done, under the names of *Hemicapra* and *Hemitragus*.

#### OVIS.

A more or less marked, rounded, suborbital depression, but no fissure ; the masseteric ridge ascending high before the orbit ; the auditory bulla small ; the basioccipital flat, more or less expanded anteriorly by the extension of the anterior pair of tubercles, the posterior ones small ; the incisors nearly equal-sized, sloping ; the molars without supplemental lobes.

Horns broad at the base, transversely wrinkled, bent outwards, with a more or less marked spiral curve in a direction contrary to that occurring among the Antelopes, and a longitudinal ridge or angle.

*Hab.* The Northern hemisphere.

*O. ammon.*

*O. nahura.*

*O. Vignei.*

*O. tragelaphus.*

*O. aries.*

It is a matter of surprise to me that naturalists should almost universally have given *no* suborbital sinus, as characteristic of the genus *Ovis*, since it is very perceptible in the Domestic Sheep ; and in some other species, especially the *O. ammon*, judging by the appearance of the stuffed specimens, and by the fossa upon the skull, it must be of very considerable size. I do not perceive it, however, in the *O. tragelaphus*, nor in the *O. nahura*. Although Mr. Gray maintains the long-established error, the observations of Mr. Ogilby and Mr. Hodgson agree with my own in this respect ; the latter gentleman, who far exceeds Mr. Gray in the number of generic divisions, even separates *O. nahura* and *O. barhel* as a distinct genus under the name *Pseudovis*, on account of the absence of "eye-pits."

#### OVIPOS.

A small depression in front of the orbit ; no fissure ; the masseteric ridge ascending before the orbit ; the auditory bulla of moderate size ; the basioccipital bone broad and flat, with a ridge and a fossa on each side ; the anterior part of which is rough ; the fossa at the side of the occipital condyle filled up and produced into a blunt process, upon which the articulating surface is continued ; the molars without supplemental lobes.

Horns broad at the base, tapering, pressed downwards against the sides of the head, and the points bent upwards.

*Hab.* The North Polar Regions.

*O. moschatus.*—This animal, which derives its name from its gene-

ral aspect being intermediate between that of the Ox and that of the Sheep, has generally been placed among the Bovine forms. Taking the aggregate of its characters, it appears to me to be at least as nearly, if not more, allied to the Sheep, but should most properly stand alone.

The remaining genera constitute the true Bovine type, and agree among themselves in most characters of the skull. I fear that Mr. Gray's distinctions, in the extent of the intermaxillary bones upon the sides of the nasal aperture, will not always hold good. Their general cranial character may be given first;—

No suborbital fissure, nor fossa; the masseteric ridge ascending rather high before the orbit; the auditory bulla moderate, compressed; the basioccipital bone with its tubercles well-developed, and a deep groove between them; the incisors nearly equal-sized, slightly bending outwards, and the molars with well-developed supplemental lobes.

### Bos.

Horns placed upon the extremities of the ridge terminating the occipital plane, directed outwards.

*Hab.* Europe and Asia.

*B. taurus.*

*B. gaurus.*

*B. frontalis.*

*B. bantiger.*

### BISON.

Horns round, situated in a plane anterior to that of the occiput, directed outwards and curved upwards.

*Hab.* The Northern Temperate regions.

*B. urus.*

*B. grunniens.*

*B. Americanus.*

The last-named species is a true Bison, as the position of the horns, and the woolly fur, make apparent; the fur being generally more copious, may reasonably be expected to extend further upon the muzzle; and the generality of instances proves that the extent of naked surface may differ in very nearly allied species, and is not sufficient to warrant generic distinction. Therefore I do not think it advisable to adopt the genus *Poëphagus*.

### BUBALUS.

Horns attached in a plane anterior to that of the occiput, flattened or trigonal, inclined outwards and backwards, with the point bending upwards.

*Hab.* Southern Asia, its islands, and Africa.

*B. buffelus.*

*B. depressicornis.*

*B. brachycerus.*

*B. Caffer.*

Although Major Smith was deceived as to the affinities of the Anoa, later as well as earlier naturalists have assigned it to its true place, and a glance at the stuffed specimen in the British Museum leaves the matter beyond a doubt. I have examined the skull in the

Museum of the College of Surgeons, and cannot see that it has even a title to generic distinction. Naturalists seem at all times to have been prone to assign generic rank to whatever was mysterious or difficult to classify, and I can in no other way account for this species being made a genus.

It will be seen that my endeavour has been rather to ascertain and demonstrate whatever natural degrees of relationship exist among the species of this family, than to compose a system for mere convenience of reference; but so far from that being any hindrance to the practical adoption of my views, I think that in arranging the specimens in a museum, or the materials of a work, it will generally be found more convenient to be able to dispose the members of a natural group in whatever order may suit our immediate object, than to be compelled to place them in accordance with the stringent laws of a purely analytical method; and that for the purpose of referring a new species to its true location, when we have not the means of observing all characters that may be necessary for the determination of a series of natural affinities, the external characters which can be assigned to a group when its limits are well made out, will be found sufficient; while on the other hand, not only the external characters, but sometimes even those of anatomical structure, will, in a group which has not been previously subjected to a full and careful examination, be as the letters of an unknown language, often leading into error and confusion.

With regard to nomenclature, I have used such names as I find most generally adopted by later naturalists who have given attention to this subject, generally taking, where I had a choice, such as appeared to have been of earliest date; and as I only enumerate such species as I have seen, I must not be considered, although I have omitted a few which appear to be varieties, as rejecting all that are left out.

#### BOTANICAL SOCIETY OF EDINBURGH.

Thursday, 10th of July, 1851.

Dr. Balfour exhibited specimens of the following monstrosities:—

1. An *Arum* with a double spathe, the second spathe being alternate with the first. The spadix at the lower end showed the appearance of the adhesion of a second spadix. This specimen was from the garden of Dr. Neill, Cannonmills Cottage.

2. A monstrosity of *Antirrhinum majus*, presenting a regular flower formed by five personate petals with gibbous bases.

3. Monstrosity of white *Digitalis* showing the terminal floret composed of several united, and expanding before the other flowers in the raceme. There was thus a mixed inflorescence, partly definite and partly indefinite.

A letter was read from Mr. Wyville Thomson, Lecturer on Botany, King's College, Aberdeen, in which he states:—"A few days ago, walking along Dee-side about seven miles above Aberdeen, I was much surprised to see *Prunus spinosa* covered with large handsome fruit